

MEMORANDUM OF UNDERSTANDING (MOU)
between
THE UNITED STATES DEPARTMENT OF ENERGY (DOE)
and
THE ELECTRIC POWER RESEARCH INSTITUTE (EPRI)
on
COOPERATION IN LIGHT WATER REACTOR RESEARCH PROGRAMS

PURPOSE

The DOE and EPRI each conduct research and development (R&D) in technologies that have application to Light Water Reactors (LWRs). DOE and EPRI have cooperated extensively in nuclear energy R&D and have entered into several successful agreements and collaborations in areas of common interest (see Attachment 1 for a discussion of previous collaborations). Historically, for major joint programs, nuclear R&D collaboration has been under a specific MOU or Cooperative Agreement. Currently, collaboration in nuclear R&D is less formal, generally under a broad DOE-EPRI agreement, the Sustainable Electricity Partnership (SEP), which applies to all energy research. A number of factors suggest that establishing a general MOU between the parties for all nuclear energy R&D would be very beneficial in 1999 and beyond.

The purpose of this MOU is to establish the guiding principles under which cooperative research programs between EPRI and DOE's Office of Nuclear Energy, Science, and Technology will be planned and conducted. Individual cooperative research initiatives will be described in addenda to this document.

This MOU takes into account the following factors:

- reduced funding to R&D (prompting increased efforts to leverage limited resources through cost-shared R&D);
- increased attention by national and world policy makers to the importance of nuclear energy as a reliable and environmentally superior energy source, capable of meeting large-scale energy needs in the next century, the need for state-of-the-art technology solutions to realize nuclear energy's full potential, and signs of increased willingness by Congress to invest in nuclear energy as a critical technology for our future;
- increased focus of government R&D on higher-risk, longer-term technologies, at the same time private sector R&D is becoming increasingly focused on shorter-term return on R&D investment. If EPRI becomes too focused on short-term work it reduces its ability to develop the underlying new technology to support short-term products, and if DOE becomes too focused on long-term work it reduces its connection to the marketplace – for R&D ideas and priorities and for confirmation of value from completed basic R&D. This creates the strategic need for greater cooperation through public-private partnerships to complement each other's strengths and weaknesses – so that both DOE and EPRI can provide greater value over the full spectrum of R&D; and

- the advantages of cooperation under the “DOE-EPRI Sustainable Electric Partnership”, which recognizes that both DOE, as a Federal agency, and EPRI, as a non-profit, utility- led organization, conduct R&D in the public interest of U.S. energy consumers.

The primary focus of this MOU will be on the R&D goals, objectives, and tasks included in the “Joint DOE-EPRI Strategic R&D Plan for Optimizing Current Nuclear Power Plants”, first issued in March 1998. This focus relates closely to DOE’s FY 2000 proposed “Nuclear Energy Plant Optimization” (NEPO) program. However, the scope of this MOU also includes potential R&D cooperation related to other proposed DOE programs, and to future programs with potential for joint cooperation.

This MOU will facilitate improved cooperation between the parties, resulting in greater integration of both planning and execution of R&D. It will also enable both parties to better conserve resources, avoid duplication, and more efficiently establish and fund cooperative efforts.

MANAGEMENT AND PROGRAM GUIDELINES

Objective. The goal of the parties is to support common efforts to improve and expand the use of nuclear energy through technology and technology-based processes. Keys to these efforts in the near-term are objectives associated with improved operational and cost performance and license renewal of existing facilities. Shortly following these efforts will be objectives associated with improving the projected operational and cost performance of future nuclear facilities that are based on currently available technology (i.e., Nuclear Regulatory Commission (NRC)-approved Advanced Light Water Reactor (ALWR) designs). In the longer term, objectives associated with new, innovative concepts in nuclear technology will become increasingly important areas of cooperation. EPRI and DOE can jointly share these goals within the context of roles that emphasize short-term and mid-to-longer term R&D respectively. Shorter-term goals still need support from basic research, and longer-term goals will need market input and customer support for commercialization.

Scope of Cooperative Activities. The scope of this MOU is nuclear energy supply technology needs of common interest to industry and government. This scope is intentionally broad, in order to capture all nuclear supply R&D with a potential for cooperation, coordination, or potential cost-sharing. This MOU incorporates by reference, the *Joint DOE – EPRI Strategic R&D Plan to Optimize U.S. Nuclear Power Plants*. In the event that the Joint DOE-EPRI Strategic Plan is changed, EPRI and DOE may amend this MOU, in accordance with the Amendment and Termination subparagraph of this MOU, or, on an interim basis, through expanded tasks under this MOU that would be captured in the next update to the Joint R&D Plan. For this broad scope to be addressed by this MOU, specific R&D initiatives will be identified in general policy terms and documented as Addenda to this MOU. Similar to this document, each Addendum may be signed by the signatories to the basic MOU, or by their designee or designated replacement. These Addenda are intended to provide policy direction for the objectives, scope, cost-sharing and management arrangements, and other policy matters that need executive concurrence between DOE and EPRI. These Addenda then become the basis for cognizant DOE and EPRI staff to develop definitive contracts, detailed work scope and

deliverable definitions, other requirements for potential contractors, Cooperative Agreement text, requests for proposals, etc., as necessary to initiate and manage the work.

Management. The management of activities under this MOU falls into two broad categories:

1. Coordinated but independent activities. In general, work in this category will be managed by either DOE or EPRI, using standard, approved processes for R&D management. Funding is also likely to be independent for work in this category. Coordination will be limited generally to joint planning (in order to ensure no overlaps and gaps in respective programs), joint communications, and, where appropriate, joint program reviews as work is undertaken.

2. Collaborative and cost-shared activities. DOE and EPRI intend for work in this category to be planned and executed on a partnership basis. This partnership should involve to a significant degree joint management and/or joint funding. Lead management responsibility should be assigned to one of the parties for reasons of efficiency. The model Cooperative Agreement and model Participation Agreement under the SEP, (see attachment 1) will serve as the basis for lead EPRI management and lead DOE management, respectively.

In general, there are a number of reasons why R&D of common interest should be managed as collaborative and cost-shared activities whenever possible. First, greater assurance is achieved in reaching common visions, goals and objectives, and in eliminating duplication and gaps. Second, greater leveraging of resources and stronger rationale for increasing the R&D investment by respective R&D funding sources (Congress, utilities) is achieved when DOE and EPRI work together. Third, the ability of the U.S. to draw additional support from overseas is increased significantly when DOE and U.S. industry are in partnership.

DOE and EPRI will endeavor to plan, integrate and prioritize nuclear R&D in both the independent and collaborative categories listed above, and to keep each other informed of meetings, correspondence, etc., in order to strengthen the partnership.

Advice and Guidance. Key advisory resources critical to this MOU include the DOE Nuclear Energy Research Advisory Committee (NERAC), the EPRI Nuclear Power Council (NPC), and the various committees and subcommittees under NERAC and the NPC that provide recommendations on the specific technologies within the scope of DOE and EPRI programs, including work under this MOU.

A committee has been established to coordinate joint DOE-EPRI R&D planning. The Committee has been designated as the “Coordinating Committee for the Joint DOE-EPRI Strategic R&D Plan to Optimize U.S. Nuclear Power Plants”, or the “Joint Coordinating Committee”. This Committee was approved by DOE and EPRI in August, 1998 and is comprised of utility executives and senior managers, along with a representative from the NRC, Nuclear Energy Institute (NEI), Institute of Nuclear Plant Operators (INPO), DOE National Laboratory, and the university community. This Coordinating Committee interacts directly with the NERAC Subcommittee on Operating Plants and with the NPC.

Program Funding. Work within the scope of this MOU will be conducted under separate agreements, with funds provided by DOE, EPRI, and others. DOE will provide a maximum of 50% overall cost-share for work under this MOU. This cost-share requirement is not applicable at the project level. When cost-sharing provisions are established, funding sources can be further leveraged within the U.S. (e.g., NRC, National Academy of Science (NAS), Department of Defense (DOD), commercial suppliers and investors), and a variety of public and private international funders. DOE and EPRI are committed to work together to encourage maximum external leveraging of activities under this MOU. The details of the scope of work and the level of funding support to be furnished by specific parties will be developed in other agreements or MOUs (i.e., Addenda to this MOU, cooperative agreements, contracts, etc.). This MOU shall not be used on its own to obligate or commit funds, or as the basis for the transfer of funds.

Obligations. This MOU is intended to be an expression of intent and does not create a legally binding obligation. The rights and obligations of the parties with respect to matters referenced herein shall be subject in all respects to the approval of DOE's Management and EPRI's Board of Directors, and the execution of definitive agreements mutually acceptable to all parties.

Implementation. DOE and EPRI agree to establish a Management Team consisting of two representatives from each party including the Director of the Office of Nuclear Energy, Science and Technology at DOE and the EPRI Chief Nuclear Officer. The Management Team shall meet at least annually, and shall:

- review the status and progress of ongoing cooperative research programs;
- review potential new candidate cooperative research programs;
- agree on priority, terms and conditions of new cooperative research initiatives; and
- provide direction on continued work, termination or other matters, as necessary.

Technical oversight of individual R&D tasks will be accomplished by additional review groups established as needed as subcommittees of the Joint Coordinating Committee.

The Management Team may recommend that the managing entity terminate a cooperative R&D project at any time due to unsatisfactory contractor performance, lack of funds, changes in priority, or any other reason.

Other parties, both international and domestic organizations, may be invited to participate in any cooperative program, by common agreement of the parties. Emphasis will be given to participation by NRC where feasible.

For co-funded activities, the percentage of cost sharing will be flexible and by common consent. Unless otherwise specified in long-term agreements, the cost-sharing arrangements shall be reviewed and renewed each year. This flexibility is needed to cope with year-to-year changes in funding levels and priorities by primary funders. In general, the cost-sharing arrangement will be proportional to the value of the results to each party. Cash contributions, as well as the value of services (e.g., contracting, and program management) or other contributed work can be considered in the cost-sharing arrangements.

ADMINISTRATION

Patents, Technical Data, Financial Policy, and Public Information Coordination. The standard terms and conditions in the model Cooperative Agreement and model Participation Agreement shall be used whenever possible. Addenda under this MOU shall specify exceptions to those standard terms and conditions when deemed necessary by the parties.

In general, and subject to definitive agreements, the following principles apply:
All non-proprietary data or results produced by the cooperative program shall be shared by all participants, and each party shall be free to disseminate them to whomever they choose. Proprietary information supplied to support conduct of the research will be protected in accordance with applicable rules and regulations.

DOE and EPRI shall be free to publish the data or results from cooperative R&D programs in reports, journals, or conference proceedings, as they judge appropriate. Publication of data or results from cooperative R&D programs by contractors shall require the approval of the Management Team.

On a project basis, the parties will jointly determine if patents generated by the program should be obtained. Any patent rights will be allocated consistent with applicable laws and practices and as agreed to by the parties.

Either party shall, at its request, have access to visit the facilities, separately or jointly, and to review the data associated with the project.

Amendment and Termination. The intentions expressed by this document may be changed from time to time by written amendment or documentation between DOE and EPRI or terminated by either party upon 60-day written notification to the other party.

Effective Date. This document shall be effective upon the date of signature. The parties intend for this relationship to continue for a period of five years, unless extended or terminated per above.

Originally signed by William D. Magwood

09-22-1999

William D. Magwood, IV, Director
Office of Nuclear Energy, Science, & Technology, DOE

Date

Originally signed by Robin Jones

09-23-1999

Robin Jones, Vice President
Science and Technology Development and Chief Nuclear Officer, EPRI

Date

BACKGROUND ON DOE-EPRI COOPERATION IN NUCLEAR ENERGY R&D

DOE-EPRI Participation Agreement. DOE and EPRI signed a Participation Agreement on Sept. 29, 1981 that provided for cooperation between them in the advancement of safety, reliability, efficiency, environmental compatibility, and commercial acceptability of systems for the production, transmission, distribution, conservation, and utilization of electric energy.

The ALWR Program. In 1987, DOE, EPRI, and the Advanced Light Water Reactor (ALWR) Utility Steering Committee established a Memorandum of Understanding to govern decisions made in jointly funded ALWR programs related to development and application of the Utility Requirements Document, and the sponsorship of four LWR Reactor designs by three U.S. reactor vendors and their design teams. The primary focus of cooperation under this MOU was on 1) obtaining design approval and formal Design Certification by the Nuclear Regulatory Commission (NRC) for the mid-size, passively safe ALWR design, the Westinghouse AP600, and on 2) developing the technical basis that would support NRC approval of a second passively safe design, the General Electric Simplified Boiling Water Reactor (SBWR).

In 1992, two Cooperative Agreements were developed to govern jointly funded First-of-a-Kind Engineering (FOAKE) for two selected designs, the General Electric Advanced Boiling Water Reactor (ABWR) and the Westinghouse AP600. The two cooperative agreements for FOAKE were between DOE and the Advanced Reactor Corporation (ARC), and between ARC and EPRI. The first established ARC as the primary governing body for the fifteen nuclear utility companies that co-sponsored the FOAKE Program with DOE, and the second established EPRI as the channel for the utility funding.

Virtually all work on the ALWR Program is now complete; and the MOU and Cooperative Agreements between DOE, EPRI, and ARC are either terminated or dormant, since no joint funding of ALWR technology between DOE and EPRI exists today. However, the historic partnership between DOE and EPRI for completing the ALWR Program and the documents for its management provide a strong basis for future cooperation. It represented one of the largest and most successful cost-sharing arrangements with the private sector in DOE history.

License Renewal. DOE and EPRI signed an MOU in July 1991 to cooperate in efforts to provide a basis for substantially extending the service lifetime of nuclear power plants in operation, under construction, or under development. The goal of the parties was to cooperate in the development, review, and conduct of cooperatively developed programs for the renewal of LWR licenses and improvement of plant operating lifetime. The objectives of the program included establishing license renewal guidelines and technical bases to manage aging of plant equipment important to license renewal, and supporting the submission and approval of lead plant renewal applications to the NRC.

The initial phase of this program was completed under a prior MOU initiated in April 1986. The 1991 MOU focused primarily on lead plant submittals and on guidelines and models for future license renewal requests.

The management and funding of tasks under this MOU were generally independent. That is, DOE tasks were managed and funded by DOE, and EPRI tasks were managed and funded by EPRI – both subject to approval and availability of funds. The parties agreed to coordinate their planning of these separate tasks, and participated in each other’s reviews of program contractor work, as appropriate.

This MOU remained in force until Sept. 30, 1995. It also was a highly successful partnership and provided substantial support to early license renewal applicants. Cooperation continued after Sept. 1995, under both the SEP and informal mechanisms.

The Sustainable Electric Partnership. The SEP was approved and signed by DOE and EPRI on Oct. 5, 1994. It provided for an Annual Conference, an SEP document from that conference to be updated as needed to guide planning and execution of common programs and improve communications. It also provided a set of pre-negotiated, standardized financial mechanisms – the Participation Agreement, and the Cooperative Agreement. (In general, the former is DOE-managed, and the latter is EPRI-managed.) These financial instruments are not akin to government contracts, but rather are representative of the category of partnerships that can be established between government entities and non-profit organizations (grants and cooperative agreements). Annual Conferences have been held each year since 1995.

Nuclear R&D Cooperation under the SEP. DOE and EPRI have cooperated extensively in the planning and execution of R&D since the SEP was signed. However, most of the close cooperation and cost sharing has come under the prior ALWR and License Renewal MOUs and Cooperative Agreements. Due primarily to the downward trend in appropriations for nuclear R&D since 1993, significant cost-shared initiatives have not materialized.

During this period, DOE and EPRI coordinated with the Nuclear Energy Institute and the national laboratory and university communities to establish a better appreciation of the importance and national value associated with nuclear energy R&D. DOE addressed the importance of nuclear energy in its Sustainable Energy Strategy and in the Secretary of Energy Advisory Board Task Force on Strategic Energy R&D. The latter argued strongly for increased cooperation and cost-sharing by DOE with the private sector and specifically encouraged increased cooperation with EPRI and the Gas Research Institute (GRI).

During this same period, EPRI prepared and published annual updates to the ARC Report to DOE on Advanced Reactor Development; and issued the Nuclear Energy R&D Strategic Plan in Support of National Nuclear Energy Needs” in 1996 and 1997. These reports not only provided the strategic rationale for a strong nuclear energy supply R&D program at DOE, but also proposed the specific R&D objectives and tasks that were needed.

At the Oct. 1997 SEP Annual Conference, DOE and EPRI committed to a different approach – to develop jointly and publish an integrated Strategic R&D Plan – one that would clearly demonstrate the common commitment to public-private partnership, and one that would identify and prioritize the R&D tasks seen as essential, both by U.S. utilities and by the Federal Government. In March 1998, DOE and EPRI published their “Joint Strategic R&D Plan to

Optimize U.S. Nuclear Power Plants.” This document is a market-based assessment of nuclear R&D needs, independent of funding sources and recipients.

The DOE-EPRI Joint R&D Plan was prepared in full consideration of the publication in late 1997 of an important report by the President’s Commission of Advisors on Science and Technology on the energy needs of the 21st Century. That report significantly shaped the proposals by DOE for nuclear energy supply R&D in FY1999, and influenced the content of the Joint R&D Plan.

With the completion of the ALWR program and active role of ARC in funding and managing work under that program for the industry, the ARC Cooperative Agreements have been terminated. Future Cooperative Agreements between DOE and the utility industry for nuclear energy R&D will be enacted directly between DOE and EPRI.